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Thesis

Observations on Smallpox and Vaccination
(with cases)

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Observations on Smallpox and Vaccination, (with cases.)

During the latter part of 1887 and early part of 1888, smallpox was very prevalent in Sheffield, and afforded me many opportunities of studying that disease.

While the epidemic lasted I vaccinated or revaccinated upwards of 600 persons, and attended 104 cases of Variola; of which 89 were discrete; (no deaths); 12 confluent (7 deaths); and 3 of a modified type (no deaths). The discrete form varying widely in degree was noted in those who were partially protected by vaccination in earlier life; the confluent variety was invariably found in those who had never been vaccinated.

It is not my intention in this paper to deal with the subject of

Smallpox in all its various aspects, as these are fully and clearly described in most medical Text Books; but rather to discuss certain cases which occurred in my own practice, and which to me seemed to possess some points of interest.

Early in the outbreak I had my attention drawn to certain individuals, who, although unvaccinated, seemed, from their immunity from attack, to be insusceptible to the disease; cases having come under my notice where a patient suffering from smallpox has been nursed by an attendant who never had smallpox, nor been vaccinated, who, moreover, would not submit to be vaccinated, and apparently suffered no ill effects from such perversity. Apropos of this question; "Bristowe" 2nd Edition page 166, and 5th Edition page 171; states;

"All persons, indeed, are liable to take
"it, unless protected in one or other of

" the ways..... adverted to, or (as rarely
 " happens) by some peculiar constitutional
 " insusceptibility..... and it is a curious
 " circumstance that those who, in spite of
 " constant exposure, have enjoyed immunity
 " from the disease for many years not
 " unfrequently end by contracting it, and
 " have it in a severe form."

On the other hand Dr. Collie, in Quain's
 Dictionary of Medicine, (Subscription Edition) page
 1440, states;

" Some few — of whom Morgagni, Boerhaave,
 " and Diemerbroeck are said to have been
 " Examples — are insusceptible of smallpox.
 The probable explanation of this, I surmise,
 is to be found in the state of health
 of these individuals, the "Vis medicatrix
 Naturae" of the tissues at the time, being
 sufficiently great to resist or overcome
 the contagium, but in no way indicating
 permanent insusceptibility to variola. This

This conclusion I arrived at through the experience gained from the following cases; B. J. - a Boy aged 4 years (unvaccinated) was brought to my surgery on the 14th January 1888 to be vaccinated, the father at the same time being revaccinated. Success attended the revaccination of the father, but in the case of the boy the vaccination was unsuccessful, a second, and third attempt being equally futile, although both human and calf lymph had been employed, and successfully used, upon patients revaccinated on each of the three occasions. Under the circumstances, I felt justified in asserting that the boy was not likely to have an attack of smallpox. This assertion unfortunately was not correct, for in the April following Mrs J. aged 31 years, vaccinated in infancy; the mother of the child; had a mild attack of variola.

In the course of her convalescence, and on the first day she came "downstairs", she inadvertently kissed the boy. Five days after he had an attack of confluent smallpox, which ended fatally. another child, (vaccinated), aged $2\frac{1}{2}$ years, living in the same house and exposed to the same influences was not attacked.

The mother attributes the infection of the child to her having kissed him, but it is evident that this cause had not sufficient time in which to operate. about a week after attending the previous case, I was called to a gentleman named S. whom I found in the early stage of smallpox. (vaccinated) On making enquiry as to whether all the other members of the family were vaccinated, I ascertained that a daughter, E. M. S. — aged 10 months, had been when about 3 months old three times unsuccessfully vaccinated by a neighbouring

practitioner, and, who certified to the child's
in susceptibility. Acting on the principle that
"prevention is better than cure", while re-
-vaccinating the mother I vaccinated the
child, this time successfully, probably
saving the child from the same fate as
the boy B. I. In addition it
is not a very uncommon thing for
children to be pronounced susceptible
to vaccine, so far as could be ascer-
-tained at the time, when vaccination
was attempted. That this was not al-
ways dependent upon the lymph has been
frequently shown where a number of
children have been vaccinated at the
same time, and all but one "took",
this one after several attempts being
pronounced susceptible, and a certificate
given accordingly. Since the two cases
quoted, I have little confidence in the
continuance of the "peculiar Constitutional

insusceptibility," as after an interval of months the one child contracted a fatal attack of confluent smallpox and the other was successfully vaccinated. I now usually request the parents of such a child to allow me to vaccinate it again after a lapse of six months and so far in the cases tried with unvarying success. This arrangement is more generally adopted, and even enforced by law in the case of stubborn parents, who, to use their own words "don't wish the child punished any more" ~~it~~ might I believe prevent many ~~and~~ mistakes and misconceptions as to insusceptibility.

The undernoted cases clearly show the danger to unvaccinated persons of smallpox especially when it is prevalent, as in the Sheffield Epidemic;

On the 5th December 1887 I was called

to see W. B. aged 7 years and found him in the first stage of smallpox.

Owing to the severity of the symptoms (which I always found to be a good guide to the severity of the attack), I was led to enquire whether the boy had been vaccinated and was told that he had not. The mother having "no faith" in vaccination had availed herself of the opportunity offered by ~~the~~ the family's removal from a Country district into Sheffield to escape the process. The attack which was of the confluent type ended fatally six days afterwards.

In this house were other five children, four vaccinated; one unvaccinated, all under ten years of age. The unvaccinated child I forthwith vaccinated, successfully, (thus shewing by inference that previously it had no

constitutional insusceptibility) and neither it, nor any of the other vaccinated members of that family contracted the disease. So forcibly impressed were the parents by the seeming imperviousness of the vaccinated children to smallpox that they are now firm believers in vaccination.

Baby W.— aged 6 weeks, unvaccinated; when called to see it on the 22nd December 1887, I found it suffering from confluent smallpox and in a comatose condition, the child died within twenty-four hours of showing the variolous eruption. Two other children aged respectively, 3, and 5 years; both vaccinated, escaped.

Baby M.— aged one month, unvaccinated, died after four days illness from confluent smallpox. Several other children (vaccinated) in this family escaped infection.

but the father, vaccinated in Infancy, but not revaccinated, has an attack of discrete Variola from which he recovered.

On the ~~16th~~ 23rd December 1887, I was called to attend J. W. — aged 16½ years, unvaccinated, and found him suffering from confluent smallpox from which he died on the 31st of the same month.

On the sixth January 1888. Nellie W. — aged 14 years, vaccinated, contracted the disease; ^{in childhood} In this instance, the attack was of a distinctly milder type than in the case of her brother J. W. —, and the patient made a good recovery.

Few who have had any experience of an epidemic of smallpox will fail to appreciate the value of revaccination, and on this point the following facts are noteworthy:

several cases of smallpox having

occurred amongst the employees of Messrs
 Mr. Turtou & Sons (Lim^d), it was resolved
 by the senior partner Sir Fred^l. Thorpe
 Mappin to have all the workmen
 revaccinated at the expense of the firm.

On the 21st January 1888, I revaccinated
 180 of the workmen, successfully, and,
 from subsequent enquiry, I learned, that
 there was not a single case of
 Variola amongst those revaccinated.

It is also a well authenticated
 fact that amongst the post office
 officials in Sheffield during the Epidemic,
 all of whom had been revaccinated,
 no one was laid aside by smallpox,
 and, further amongst the Medical Men
 in the town; the only one who
 contracted the disease, was an
 unqualified Assistant named B.—; an
 undergraduate of Glasgow University; who
 was unvaccinated, and in whose case the

attack ended fatally. Besides these ~~cases~~ instances, I might mention others, where those living in the same house with a smallpox patient, have been revaccinated, and, although exposed to the contagium have suffered no harm. In all these the "peculiar constitutional insusceptibility" apart from vaccinia could not have played a part.

I may here remark the perfect protection afforded by two marks instead of the usual number insisted on by Government in the case of public vaccinators. (four). ~~and~~ In private practice if more than two are suggested, objections are commonly raised. My Experience, however, is, that two good recent pocks are absolutely protective when smallpox threatens, for not one of the 600 vaccinations, or revaccinations, which I did while the Epidemic continued, contracted

the disease in any form. It seems to me that it is not the quantity of vaccine lymph which enters the system, or the number of points through which it gains admission which requires consideration, so much as the quality and power of the lymph to produce that constitutional change of which the vesicle is but a local sign. If this be well marked, - let it be in one, two, three or more places, - I hold it is evidence enough that protection is complete for a time, at least.

I am aware of the diversity of opinion which exists on this matter and the conclusion arrived at by many that the protection against smallpox is in direct ratio to the number and size of the resulting cicatrices of vaccination. Why it should be so is difficult to understand unless the tissues, especially during rapid changes of early life;

res themselves of the smaller vaccination in a shorter period of time than is possible with the larger. It may be so. Evidence I think is wanting on this point. Constitutional susceptibility to vaccinia, also, apparently varies in different subjects, and at different times in the same subject, so that a small quantity of lymph may produce as much vital change in one subject, as a much larger quantity would cause in another.

More cannot be expected of vaccination than of smallpox. Medical men of large and long experience have found that one attack of smallpox, does not ensure a patient against another attack except for a limited time; and, moreover, that an attack of smallpox does not prevent an individual being successfully vaccinated in later life. It is therefore of importance to determine how long

one vaccination pock confers immunity from variola in comparison with two, three, or four pocks respectively; and likewise important, though perhaps not equally so, to know the number of years which may intervene before vaccination can be successfully performed on a patient who has recovered from either a mild or a severe attack of discrete smallpox, as compared with successful vaccination following the semi-confluent or confluent type of the disease.

This raises the questions, - When should revaccination take place? and, how far should revaccination, in addition to primary vaccination, be made compulsory?

The Germans have set us an example in this respect. The German Vaccination Commission, held sittings in Berlin from October 30th to November 5th 1884 and a summary of the more important statistics

and charts, as prepared by them, appeared in the British Medical Journal of August 1885. (page 408). These statistics and charts seem to me to conclusively prove the value of revaccination, which was made compulsory in Germany at the age of 12 years in 1874, ten years before the Commission sat. The practical and ~~result was~~ ~~the~~ speedy fall in the number of smallpox cases, and in the mortality which succeeded that beneficial law; as well as the maintenance of that fall right on through the years which followed; a condition previously unknown in Germany, - while the large towns of other nations, continued to ebb and flow as in former years, makes the subject one of importance. Probably revaccination at an earlier age than 12 years, would be still more beneficial to the community, and if adopted by

other nations also might bring the eradication of smallpox within the range of possibility. ~~in~~ So far however as my opportunities for observation have extended, in no instance ~~single~~ has a vaccinated child under 12 years been attacked by variola, and my firm conviction is that under that age complete immunity is secured. There is also grounds for believing from the great number of cases of discrete variola in adults, vaccinated in Infancy, that the primary vaccination if efficiently performed, although it may not confer immunity, at least, until well on in life, has an influence in mitigating the severity of the attack.

While there is much can be said in favour of Compulsory revaccination, I am afraid that the people of this Country are not quite educated

up to that point, and would 'kick' against it. If however a concise summary of the salient features of the question were printed on some prominent part of the vaccination paper, I believe it would tend to dispel a lot of the prejudice which surrounds, even, the question of primary vaccination.

Revaccination during an Epidemic, in some instances may be only partially protective, owing, I think, to the patient at time being under the influence of the contagium of Variola; e.g.;

Mrs B. - aged 28 years, vaccinated, in childhood, revaccinated on the 24th January 1888. Eight days after while the two vesicles on her arm, were developing, I was called to see her and found her manifesting symptoms

of smallpox, viz. Frontal headache, backache, vomiting, with a temperature of 102°F . On the following day about a dozen papules appeared on the face and wrists. The attack proved to be a very mild one the papules aborting, this result in great part due probably to the beneficial influence of the previous re-vaccination which had evidently taken place about the fourth day of the incubation period, allowing that period to stand at 12 days. Vaccinia and Variola therefore were running a race in which neither was victorious.

Bristowe (2nd Edition page 180) mentions,

"The vesicle..... which follows revaccination attains its maximum on the seventh or eighth day, so that if the patient has been previously vaccinated the operation may possibly be performed beneficially as late as the fourth

"or fifth day after exposure".

J. H. - aged 10 years - unvaccinated, was exposed to variolous influences, (his brother having an attack of discrete Variola,) and I immediately vaccinated. Six days afterwards, he developed a severe discrete eruption of smallpox. He ultimately made a good recovery. In this case there was no chance of the vaccination ousting the smallpox which had already had a start of presumably six days. It may have had, however, a very decided effect in modifying the action of the contagium, for this was the only hitherto unvaccinated patient who did not develop an eruption of the confluent type.

Bristowe (2nd Edition page 179) says, "It should be borne in mind that Vaccination has no modifying effect on smallpox which has been contracted unless it be so timed that the maturation of the

" vaccine vesicle shall precede the
 " period of the variolous invasion.

" Thus, since the primary vaccine vesicle
 " attains its full development on the
 " ninth or tenth day, and the latent
 " period of smallpox is usually twelve
 " days, primary vaccination, to have
 " any beneficial effect, should be per-
 " formed certainly not later than the
 " second or third day after exposure
 " to the variolous contagion."

W. H.- aged 30 years, Railway Porter,
 unvaccinated, came to my Surgery on the
 10th January 1888 to be vaccinated. While
 vaccinating him, I remarked that he was
 feverish and he answered that he did not
 feel well. I advised him to go home and
 go to bed. Two days after he called in
 his Club Surgeon from whom I ascer-
 tained that the vaccination had not taken
 and that the man had a severe attack

of Confluent smallpox to which he succumbed ten days after its first appearance. In this case the vaccination was almost simultaneous with the appearance of the Variola and had evidently no time to confer any benefit.

The following case is interesting not ~~only~~ only from its rarity but also from the fact that however much in some respects Varicella in its severer form may resemble Variola they are specifically distinct diseases.

Two children attended for varicella 7th to 13th December 1887, afterwards Mr. M. the mother, from the 22nd to 27th Dec 87. She had been vaccinated in Infancy; 34 years before. In this case the chickenpox was suspiciously like Variola, the vesicles becoming pustular in character. On the 18th January 1888 premonitory symptoms

of smallpox appeared, which developed into a rather severe attack of that disease, semi-confluent in type. Recovery complete on the 7th February 1888.

Smallpox during pregnancy may have a fatal effect on the foetus in utero, indirectly. The undernoted case I think bears out that view,

W^{rs} O., - aged 23 years, had been vaccinated in childhood. I attended her for ~~semi~~-confluent small-pox, she being then five months advanced in pregnancy. Her recovery was good. Four months later I delivered her of a dead child. It was her first accouchement and the delivery was comparatively easy. The child had died in utero apparently about a fortnight before, and had the appearance of an eight months' infant. Maceration was in progress for the body was in part

denuded of Epidermis. The peculiar resistance to the development of tubercular phthisis pulmonalis sometimes manifested by pregnant women may have played a part in the recovery of this patient from her attack of semi-confluent Variola, and it is possible that pregnancy may act in some subtle way as a reserve force to aid the tissues in throwing off disease of a virulent character.

Primary vaccination performed 23 years before would doubtless, have some influence in the same direction. The death of the child however, is not easily accounted for. The mother who was deeply marked, must have recovered three months before the child died, and under these circumstances its death could not be attributed directly to smallpox. The question thus arises, what killed the child? A

feasible explanation is, that the variolous condition of the circulation produced some placental change which in time so interfered with the function of the placenta as to prevent the proper sustenance of the child. This view I am inclined to take from the fact that the placenta was very much atrophied, but in no other way abnormal, neither did the cuticle of the child present evidence of pitting. There was but little offensiveness of the discharges, and that was readily overcome by antiseptic vaginal douches. The patient shewed no signs of unusual disturbance and had a perfect convalescence. In the British Medical Journal (Volume I of 1886) several cases are reported by various medical practitioners of newly-born infants being susceptible to vaccination, although at the time of their confinement the

The Mothers were suffering from small-pox. This points to a probable immunity conferred upon the child while in utero.

At page 201 Mr. Quirke mentions a parturient woman sickening with small-pox who eight hours after delivery was covered with eruption. He vaccinated the child 36 hours after it was born, and, though it continued to be with the Mother it remained quite well. The woman made a good recovery but was markedly pitted.

Page 245. Mr. Richmond refers to a case of well marked discrete small-pox in a woman who was confined when the pustules were at their fullest development. Within an hour or two the infant was vaccinated and continued well notwithstanding the fact that it was suckled by a variolous mother.

at the same page a similar case is reported by Mr. Munro.

Page 343, Dr. Banning states that during the height of an attack of confluent small-pox a patient was delivered of a child which he vaccinated in a few hours and which escaped infection.

Mr. A. H. F. Cameron (page 442) gives another instance of delivery when the rash of Variola was fully out, but the child was not affected. Some weeks after birth he vaccinated this child successfully. In this last case no mention is made as to whether the child was allowed to remain with the mother during the weeks which elapsed before the vaccination was performed, or removed, and suggests the question does immunity in some cases persist for a time Ex utero. The foregoing cases were all successfully vaccinated after birth at periods varying from an hour or two to several weeks, hence I infer

that despite the incubation and initial stage of the fever, — about fifteen days — during which the smallpox was doing its work upon the Mothers, the children were quite free from the contagium, i.e., the blood passing from Mother to Child did not cause a form of smallpox sine eruptione protective against further manifestations as soon as the Child was born, otherwise it is not likely success would have followed Vaccination as it did. I can only conclude therefore that to the child in utero there is oftentimes extended a protection from disease, which may have its origin in the placenta, and due in great part to the peculiarities of the circulation in that organ.

The combination of Scarlet Fever and Smallpox in a patient Vaccinated

in childhood, was ^{to me} of peculiar interest.

I was attending H.D. and A.A.D. aged respectively $2\frac{1}{2}$ and $4\frac{1}{2}$ years, both suffering from scarlet fever. Their step sister A.G. aged 17 years, vaccinated when a baby, became feverish and I was asked to see her. All the symptoms including the rash of scarlet fever were present. On the second day the face presented small-pox papules. Third day patient complained particularly of sore throat. Fourth day the papules were aborting and the scarlatinal rash disappearing. Sixth day the temperature was normal. On the tenth day desquamation and falling off of crusts took place and on the twelfth day the patient appeared to be quite well.

I saw her 4 years later and found pitting to the extent of four or five marks. In this case there could be no doubt

of the concurrence of the two complaints; the fact of vaccination in infancy might determine somewhat the possible course of the smallpox, but the onset of Scarlet Fever must also have markedly counteracted its progress. That the invasion of Variola preceded that of Scarlet Fever is I think conclusive, for the papules appeared on the second day, or one day later than the rash of Scarlatina, the difference between the latent period of the latter and that of the former giving approximately the time intervening between the separate exposures to the contagia. Here, just as in vaccination efficiently performed early enough to develop before the variolous eruption, the scarlatinal virus was in time to hinder in a similar way the full action of the smallpox contagium, and it may be the variolous condition of the patient reacted in an equally

satisfactory manner on the Scarlet Fever,
in other words that the one disease
modified the action of the other.

William C. Taylor.